

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2**

DATE: NOV 19 2012

SUBJECT: National Priorities List Removal Site Evaluation for Cabo Rojo Groundwater Contamination Site, Municipality of Cabo Rojo, Puerto Rico

FROM: Nick Magriples, On-Scene Coordinator
Removal Assessment and Enforcement Section

TO: Joseph Rotola, Chief
Removal Action Branch

The United States Environmental Protection Agency (EPA) is required to complete a Removal Site Evaluation (RSE) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at all newly proposed and listed National Priority List (NPL) sites. The Cabo Rojo Groundwater Contamination Site (Site) was proposed for placement onto the NPL on October 21, 2010 and subsequently placed on the NPL on March 10, 2011.

The Cabo Rojo Groundwater Contamination Site (see Figure 1) consists of an undefined groundwater plume containing chlorinated volatile organic compounds (VOCs) and with no currently confirmed source of contamination. It is located in Cabo Rojo, Puerto Rico. The Cabo Rojo Urbano public water system consists of six wells (Hacienda la Margarita, Cabo Rojo 1, Cabo Rojo 2, Cabo Rojo 3, Club de Leones, and Ana Maria) and a surface water source which serve an estimated population of 47,000 people. The surface water source is the Canal De Riego del Valle de Lajas. Water from this surface water passes through the Boqueron water filtration plant prior to being introduced into the system. The Ana Maria well acts as an independent system which serves approximately 1,900 persons, while the other wells and the surface water source are blended to serve approximately 45,100 persons.

The Municipality of Cabo Rojo occupies 72 square miles in the southwest corner of Puerto Rico and is bordered by Mayaguez and Hormigueros to the north, San German and Lajas to the east, the Caribbean Sea to the south and Mona Passage to the west. The most densely populated portion of Cabo Rojo is situated in the area around Roads 100, 102 and 103. The area within the center of Cabo Rojo is a mixed setting of residential, retail, commercial and industrial. The residences are generally one or two-story structures. Public and private schools, including pre-schools are interspersed throughout the area.

CONCURRENCES

Name: Cabo Rojo Groundwater Contamination Site

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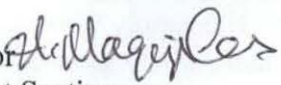
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The topography in the area of the Site is mostly flat. Extensive wetlands to the north are fed by streams that flow from the south, through the populated area, before reaching the wetlands. The Site is located in an alluvial valley that includes unconsolidated sand, gravel, and clayey sand, and marginal marine deposits underlain by limestone and volcanic

igneous bedrock. Puerto Rico Aqueduct and Sewer Authority (PRASA) supply wells impacted by the Site are finished in the bedrock aquifer within or near the wetlands. The U.S. Geological Survey has reported that there is not a continuous confining layer separating the alluvial valley aquifer and the bedrock aquifer within two miles of the groundwater plume. Groundwater exists under water-table conditions and recharges the underlying bedrock. The direction of groundwater flow in the vicinity of the Site is influenced by a cone of depression formed by the public supply wells and by nearby surface water drainage features, including the Río Viejo, Quebrada Mendoza, Quebrada Pileta and Quebrada de la Charca. The supply wells are located in the vicinity of the low-lying Cienaga de Cuevas wetland, where groundwater recharge occurs. The groundwater plume lies within a designated Wellhead Protection Area.

During routine quarterly groundwater monitoring, samples collected by PRASA in 2004 and 2005, revealed that tetrachloroethylene (PCE) and trichloroethylene (TCE) were detected in samples collected from the Hacienda la Margarita well, and on numerous occasions from 2002 to 2006, in samples collected from the Ana Maria well. PCE was detected in groundwater samples collected from the Ana Maria well at concentrations ranging from 1.8 micrograms per liter ($\mu\text{g/l}$) to 4.0 $\mu\text{g/l}$ and TCE was detected at concentrations ranging from 0.5 $\mu\text{g/l}$ to 1.6 $\mu\text{g/l}$. The Maximum Contaminant Level for both PCE and TCE is 5 $\mu\text{g/l}$.

EPA collected 13 ground water samples from active public and private supply wells in and around Cabo Rojo in July 2006. Chlorinated VOCs were detected in groundwater samples collected from the Ana Maria and the Club de Leones wells but were not detected in the other wells tested including the Hacienda la Margarita well. A groundwater sample collected from the Ana Maria well, indicated the presence of PCE (1.9 $\mu\text{g/L}$), TCE (0.63 $\mu\text{g/L}$), and cis-1,2-dichloroethylene (cis-1,2-DCE) (0.67 $\mu\text{g/L}$). A groundwater sample collected from the Club de Leones well, indicated the presence of 1,1-dichloroethylene (1,1-DCE) at 0.96 $\mu\text{g/L}$. Chlorinated VOCs were not detected in any other ground water samples collected by EPA in July 2006.

As part of a site discovery initiative to identify potential sources for the impacted groundwater supply wells, EPA (Pre-remedial) conducted site recons from November 29 through December 7, 2006 at 68 facilities/locations within the municipality of Cabo Rojo. These 68 facilities/locations included operations such as: auto/truck mechanical and body repairs, auto parts, garages, gas stations, asphalt operations, dry cleaners, wood treating, stone quarry, public works, metal fabrication, furniture manufacturing, warehouses, storage yards, electrical equipment manufacturing, wood fabrication, printing, custom blinds manufacturing, iron welding, granite fabrication, junkyard, medical supply manufacturing, and clothing manufacturing. Based on the results of this effort, EPA identified 15 facilities for further investigation.

In January 2007, EPA conducted source investigations at the 15 facilities identified as potential sources of the groundwater contamination at the Site. Samples were collected from surface and subsurface soils, and shallow groundwater using direct-push equipment. Although chlorinated VOCs were detected at three of these facilities, EPA did not

definitively identify the source of groundwater contamination in the public supply wells. The three facilities (with their shallow groundwater results) included: Extasy Q-Prints [acetone (11 µg/L), toluene (0.61 µg/L), cis 1,2-DCE (2.9J µg/L), TCE (2.1J µg/L) and PCE (14 µg/L)], Cabo Rojo Professional Dry Cleaners [vinyl chloride (1.3J µg/L), acetone (8.6J µg/L), cis 1,2-DCE (3.4J µg/L), TCE (0.66J µg/L), PCE (0.83J µg/L) and benzene (0.68J µg/L)] and D'Elegant Cleaners [cis-1,2-DCE (310 µg/L), TCE (68 µg/L) and PCE (67 µg/L)]. Note: "J" represents an estimated concentration.

In September 2009, EPA collected additional groundwater samples from the Ana Maria and Club de Leones wells. PCE and cis 1,2-DCE were detected at 1.1 µg/L and 0.39J µg/L, respectively at the Ana Maria well. The sample from the Club de Leones well indicated the presence of 1,1-DCE at 0.57J µg/L.

During the week of June 14, 2011, the EPA Environmental Response Team (ERT) conducted a preliminary remedial investigation of the site for the EPA New York/ Caribbean Remediation Branch (NYCRB) in order to determine possible sources of the groundwater contamination. Based on the previous findings, 13 potential sources were investigated using soil gas and a field portable gas chromatograph for analysis. The 13 locations included dry cleaners (7), industrial facilities (2), a printing facility (1), and three other properties. Samples were collected from outdoor locations around the potential sources as well as indoor subslab locations.

The soil gas and subslab vapor analytical results identified significant levels of PCE, TCE and DCE subslab vapors at four of the 13 properties (Extasy Q-Prints, Cabo Rojo Professional Dry Cleaners, Serrano Dry Cleaners II and D'Elegant Cleaners), including underneath the buildings associated with these properties. The maximum levels of chlorinated VOCs identified in vapors under the subslab at Extasy Q-Prints were: DCE (6,741 micrograms per cubic meter (µg/m³)), TCE (1,021 µg/m³) and PCE (6,648 µg/m³). Additionally, subslab vapor samples collected beneath a pre-school located adjacent to Extasy Q-Prints within the Centro Comercial Ana Maria strip mall were found to contain: DCE (202 µg/m³), TCE (446 µg/m³) and PCE (33,916 µg/m³). At Cabo Rojo Professional Dry Cleaners the maximum subslab levels detected were: TCE (607 µg/m³) and PCE (438,875 µg/m³). At Serrano Dry Cleaners II, where only soil gas samples were collected, the maximum levels identified in the soil gas were: TCE (645 µg/m³) and PCE (16,958 µg/m³). At D'Elegant Cleaners the maximum levels identified in soil gas samples were: DCE (199,055 µg/m³), TCE (2,203 µg/m³) and PCE (2,849 µg/m³). No chlorinated VOCs were detected in the subslab sample collected within the Walgreens building.

Based on these results and at the request of the NYCRB, the Removal Action Branch (RAB) initiated a vapor intrusion investigation (Phase I) at the four properties, with the assistance of ERT, during the week of January 23, 2012. Three of the four properties (Cabo Rojo Professional Dry Cleaners, Serrano Dry Cleaners II and D'Elegant Cleaners) were no longer in operation. The former two businesses were found to be vacant. While not operational, the rear portion of the Serrano Dry Cleaners II building was found to contain a residence. The fourth property, Extasy Q-Prints, remained in operation.

Extasy Q-Prints has been operating at this location for over 25 years. The strip mall building consists of a concrete structure separated into multiple business units. According to the owner of the building there is a single concrete slab and the walls between the printing facility and the pre-school consist of plywood. The current tenants include the printing facility, a preschool, and one unit that was being newly renovated as a modeling school. Operations at the printing facility consist of printing T-shirts, towels, and bags. The machinery used in the printing process is cleaned with water, petroleum-based cleaners, and rags. Screens used in the printing process are reportedly cleaned with liquids that contain VOCs, including PCE. An inspection of the printing facility revealed the use of a variety of chemicals, as well as an outdoor work area behind the business that contained numerous containers of paints and dyes. There is a sink present in the outdoor work area that is used to wash screens and other items, with the discharge going to the ground and/or a trench that reportedly flows under the building. The outdoor work area is exposed to the atmosphere and is multi-colored from the use of paints and washing. A strong organic odor was noted within the facility during the sampling event. Extasy Q-Prints is located approximately 750 feet southeast of the Ana Maria well and Quebrada Mendoza.

Cabo Rojo Professional Dry Cleaners reportedly operated for approximately 20 years at this location. The business generated PCE-contaminated sludge and was registered as a hazardous waste handler. The one-story building currently contains a number of drums and smaller containers of labeled dry cleaner chemicals and unknown chemicals within the main building and in a separate smaller structure at the rear of the property. Several of the smaller containers stored in an outside courtyard appear to have been leaking. The containers are all accessible since the windows in these two structures are not secure. There is also a hole present in the concrete that enters into the subsurface within the courtyard. Cabo Rojo Professional Dry Cleaners is located approximately 150 feet east of Quebrada Mendoza and within 1,000 feet south of the Ana Maria well.

No specific operational information was available for Serrano Dry Cleaners II. Quebrada de la Charca appears to originate just south of the building and is channelized beneath the structure prior to surfacing across the street, less than 75 feet to the north.

The D'Elegant Cleaners facility has been demolished and in its place a Walgreens and a Chinese restaurant have been constructed in separate structures. During its years of operation since the 1990s at least two different dry cleaners operated at this location. PCE and products containing other VOCs, including TCE, were used at the dry cleaner. The facility was permitted as a Resource Conservation and Recovery Act hazardous waste generator. The former facility is situated approximately 4,600 feet south-southwest of the closest impacted supply well (Ana Maria); however it is situated within 200 feet of an unnamed tributary that flows northward and eventually combines with Quebrada Mendoza prior to passing directly adjacent to the Ana Maria well.

The vapor intrusion investigation (Phase I) included the collection of indoor air and subslab vapor samples within and beneath the buildings associated with the four properties, as well as several adjoining structures. The analytical suite was focused on chlorinated VOCs at all locations, due to the contaminants associated with the groundwater contamination in the area, except those collected in and around Extasy Q-Prints. This was due to the uncertainty with the types of chemicals that were historically used at the printing facility. Elevated levels of chlorinated VOCs were confirmed at each of the source areas.

The maximum levels of the chlorinated VOCs identified in the subslab vapor at Extasy Q-Prints were: cis 1,2-DCE ($375 \mu\text{g}/\text{m}^3$), TCE ($3,370 \mu\text{g}/\text{m}^3$) and PCE ($756,000 \mu\text{g}/\text{m}^3$). The highest PCE and TCE subslab detections were obtained at the rear of the facility near the outside work area. Subslab vapor samples collected beneath the pre-school located adjacent to Extasy Q-Prints were found to contain: cis 1,2-DCE ($17.8 \mu\text{g}/\text{m}^3$), TCE ($105 \mu\text{g}/\text{m}^3$) and PCE ($7,340 \mu\text{g}/\text{m}^3$). The TCE and PCE vapor levels under the Centro Comercial Ana Maria strip mall are ten times greater than their respective indoor air risk screening levels (based on EPA Region III Risk Based Concentration Table, updated April 2012), which correspond to a lifetime cancer risk of 1×10^{-6} (1 in 1,000,000). A variety of other VOCs were also identified in the subslab vapor samples beneath Extasy Q-Prints, including: chloroform, benzene, ethylbenzene, 1,2,4-trimethylbenzene, methylene chloride and toluene at levels ten times greater than their respective indoor air risk screening levels. Other VOCs detected in the subslab vapors included: acetone, tetrahydrofuran, 1,4-dichlorobenzene, carbon tetrachloride and 1,2-dichloropropane. PCE, TCE and chloroform were also present in the subslab vapors below the pre-school at levels ten times greater than their respective indoor air risk screening levels.

Indoor air samples collected in the preschool adjacent to Extasy Q-Prints identified maximum concentrations of chloroform ($15.9 \mu\text{g}/\text{m}^3$), carbon tetrachloride ($0.52 \mu\text{g}/\text{m}^3$), benzene ($0.98 \mu\text{g}/\text{m}^3$), ethylbenzene ($1.32 \mu\text{g}/\text{m}^3$) and 1,4-dichlorobenzene ($0.762 \mu\text{g}/\text{m}^3$) that were above their respective indoor air risk screening levels. Only chloroform was slightly above the upper range of 1×10^{-4} (one in ten thousand) lifetime cancer risk level. Indoor air samples collected in the future modeling school that was being renovated identified maximum concentrations of chloroform ($2.27 \mu\text{g}/\text{m}^3$), 1,2-DCA ($1.04 \mu\text{g}/\text{m}^3$), benzene ($2.17 \mu\text{g}/\text{m}^3$), ethylbenzene ($18.3 \mu\text{g}/\text{m}^3$), 1,2,4-trimethylbenzene ($102 \mu\text{g}/\text{m}^3$) and 1,4-dichlorobenzene ($1.39 \mu\text{g}/\text{m}^3$) that were above their respective indoor air risk screening levels. It should be noted that there were paints and related chemicals present in the unit being renovated at the time of the sampling. Most of the VOCs were generally significantly higher in the indoor air samples collected in the print shop due to the operations. Furthermore, certain air samples collected outside of the structure near the print shop appear to have been impacted by its operations.

At Cabo Rojo Professional Dry Cleaners the maximum subslab levels detected were: TCE ($156 \mu\text{g}/\text{m}^3$) and PCE ($692,000 \mu\text{g}/\text{m}^3$). The levels of TCE and PCE in the subslab vapor beneath the former dry cleaner were ten times greater than the respective indoor air risk screening concentration. An indoor air sample collected from within the former dry

cleaner identified PCE at a concentration of $6.77 \mu\text{g}/\text{m}^3$. An indoor air sample collected at an adjoining vacant store detected PCE at a concentration of $4.85 \mu\text{g}/\text{m}^3$. Both results were below the indoor air risk screening level, although it should be noted that both had windows or openings that could not be sealed which would potentially dilute the concentration of the contaminant in the air.

At Serrano Dry Cleaners II the maximum subslab vapor levels detected were: TCE ($39.7 \mu\text{g}/\text{m}^3$) and PCE ($5,760 \mu\text{g}/\text{m}^3$), and at the adjacent pre-school they were PCE ($26.6 \mu\text{g}/\text{m}^3$). The levels of TCE and PCE in the subslab vapor beneath the former dry cleaner were ten times greater than the respective indoor air risk screening concentrations. An indoor air sample collected at the vacant former dry cleaner detected PCE at a concentration of $2.63 \mu\text{g}/\text{m}^3$. The result was below the indoor air risk screening level, although it should be noted that the structure had windows or openings that could not be sealed which would potentially dilute the concentration of the contaminant in the air. Chlorinated VOCs were not detected in the adjacent preschool.

At D'Elegant Cleaners the maximum subslab levels detected under Walgreens were: TCE ($1.7 \mu\text{g}/\text{m}^3$) and PCE ($187 \mu\text{g}/\text{m}^3$). The levels of PCE in the subslab vapor beneath the former dry cleaner were ten times greater than the respective indoor air risk screening concentrations. An indoor air sample collected within the Walgreens detected 1,2-DCA ($3.78 \mu\text{g}/\text{m}^3$). The result was above the indoor air risk screening level. The PCE levels beneath the nearby vacant store adjacent to the Chinese restaurant were below the indoor air risk screening concentrations. 1,2-DCA was not detected in the subslab, however it should be noted that the detection limit attained was higher than the indoor air risk screening level but below ten times the indoor air risk screening level. Chlorinated VOCs were not detected in the Chinese restaurant indoor air, although it should be noted that a door was open during the day of the sampling event due to the heat in the kitchen.

Based on the results of the Phase I sampling event, RAB initiated Phase II of the vapor intrusion investigation, with the assistance of ERT, during the week of March 19, 2012. Residential and commercial structures in the immediate vicinity of three of the four properties (Extasy Q-Prints, Cabo Rojo Professional Dry Cleaners and Serrano Dry Cleaners II) investigated in Phase I were sampled (indoor air and subslab vapor), as well as nearby schools. In all, 32 additional properties were sampled as part of Phase II. As in Phase I, indoor air and subslab vapor samples were collected for chlorinated VOC analysis, except for the area around Extasy-Q Prints which also included several additional site-specific compounds.

Of the 32 locations sampled in Phase II, eight locations were found to contain VOCs in the subslab vapors at levels ten times greater than the indoor air risk screening concentrations. The VOCs identified in these subslab samples varied with location and included: chloroform, benzene, 1, 2-DCA and PCE. Chloroform was present at these levels in half of these eight subslab locations, and the indoor air at three of those four locations exceeded the indoor air risk screening concentration. Benzene and/or PCE were detected at these levels in four of the subslab locations, but were not detected in the indoor air of those locations.

Of the 32 locations sampled in Phase II, 17 locations were found to contain VOCs in the indoor air above indoor air risk screening concentrations. The VOCs varied with location and included: chloroform, benzene, ethylbenzene, 1,2-DCA and TCE. Chloroform and/or 1,2-DCA were present at these levels in 16 of the 17 indoor locations. None of the indoor air results were above the upper range of 1×10^{-4} lifetime cancer risk level.

The data collected during Phase II revealed that PCE, and to a lesser extent, TCE were detected in nearly all of the subslab vapor samples that were collected throughout the area. Detections of 1,2-DCA were found to be present in all three of the areas investigated. In contrast, all significant detections of chloroform, benzene and ethylbenzene were associated only with the general area around Extasy Q-Prints. It should be noted that in this same area methylene chloride, toluene, PCE, ethylbenzene and 1,2,4-trimethylbenzene were detected in ambient samples. Ethyl benzene was also detected in most indoor air samples in this area.

The Agency for Toxic Substances and Disease Registry (ATSDR) has prepared a Health Consultation for the Site (February 29, 2012) since it was recently placed on the NPL. The Health Consultation concluded that current exposures to VOCs in municipal water from the Cabo Rojo system are unlikely to harm people's health since none of the public supply wells have exceeded any federal drinking water standards for the various VOCs detected in wells. ATSDR and EPA risk assessors subsequently evaluated the analytical data generated as part of the subslab investigations and indoor air investigations to determine the level of public health threat that is present in and around these four source areas, including in nearby residences. The Health Consultation (May 22, 2012), completed after two phases of air samples were collected, concluded that no harmful levels of VOCs were found in the indoor air of any of the locations in the recent sampling events. However, sub-slab sampling showed continued high VOC concentrations beneath several buildings. ATSDR recommended follow-up sampling over time to verify that indoor levels of VOCs do not increase.

PRASA, EQB and other Divisions within EPA were notified due to the significantly elevated VOC levels in the subslab vapors and the VOCs detected in the ambient air near the Extasy Q-Prints facility. EPA (multimedia) and PRASA have conducted inspections of the operating facility. EQB reportedly was planning to conduct a RCRA inspection. The abandoned and unsecure chemical containers at the former Cabo Rojo Dry Cleaner building were addressed by the property owner under EPA oversight. All containers were removed from the building on May 23, 2012 for proper offsite disposal.

The VOCs identified as part of the ongoing investigation at the Site are all CERCLA-designated hazardous substances as defined in Section 101(14) of CERCLA, 42 U.S.C. § 9601(14). The hazardous substances identified in the soil and offsite constitutes a "release," as defined in Section 101(22) of CERCLA, 42 U.S.C. § 9601(22). The Site is defined as a facility under Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

There is a potential exposure to hazardous substances or pollutants or contaminants by nearby populations or the food chain (§300.415(b)(2)(i)). Elevated levels of VOCs associated with contaminated groundwater and/or soil are present in subsurface vapors that could potentially impact occupied or soon to be occupied structures at the Site. Some of the contaminants of concern are potential carcinogens and have deleterious non-cancer effects that could adversely affect the central nervous system, kidney, liver and reproductive system.

There has been a release of VOCs to the subsurface at each of the four locations (Extasy Q-Prints, Cabo Rojo Professional Dry Cleaners, Serrano Dry Cleaners II and D'Elegant Cleaners) associated with the Site as indicated by the investigations conducted to date. Based on the available information, including the actions taken at the Cabo Rojo Professional Dry Cleaners, a CERCLA removal action is not warranted at this time. Other investigative work is warranted at certain areas of the Site to address potential health threats posed by the ongoing releases. The areas of concern at this time are listed below.

1) It is suspected that discharges from the rear outside work area at Extasy Q-Prints have impacted the soil beneath the structure and resulted in the presence of elevated levels of PCE and TCE vapors in the subslab. Chloroform, carbon tetrachloride, 1,4-dichlorobenzene, 1,2-DCA, benzene, ethylbenzene, and 1,2,4-trimethyl benzene have been identified within the interior of the adjoining units at the strip mall above indoor air risk screening levels. It should be noted that it has not been determined whether the printing facility is the source of all of these chemicals. Although the pre-school located at the Centro Comercial Ana Maria strip mall has relocated, it would be expected that there will eventually be a new tenant. One of the other units in the strip mall next to the printing facility is being renovated for a new modeling school. Assuming the issue of ambient vapor releases from the printing facility is resolved, considering the significantly elevated levels of VOCs in the subslab and the potential for these vapors to migrate into the building, a strategy should be implemented to either monitor the indoor air of adjoining units in the strip mall or install subslab ventilation units as a precautionary measure.

2) PCE was detected below levels of concern in the indoor air samples collected at both of the former dry cleaners (Cabo Rojo Professional Dry Cleaners and Serrano II Dry Cleaners) and the store adjacent to Cabo Rojo Professional Dry Cleaners. However, each of these three unoccupied buildings had windows and/or other openings that allowed air transfer to occur with the outside thus potentially diluting the sample analytical results. If these buildings are occupied in the future, the presence of elevated subslab vapors will necessitate additional indoor air samples to determine whether VOCs are at levels of concern. Considering the significantly elevated levels of VOCs in the subslab and the potential for these vapors to migrate into the building, a strategy should be implemented to either monitor the indoor air of these businesses once they are occupied or install subslab ventilation units as a precautionary measure.

3) 1, 2-DCA was detected in an indoor sample collected at Walgreens above the indoor air risk screening level, while it was not detected in the subslab. However, it should be noted that the detection limit attained for the subslab sample was higher than the indoor air risk screening level but below ten times the indoor air risk screening level. Considering the elevated levels of VOCs in the subslab and the adjoining soils beyond the building, and the potential for these vapors to migrate into the building, a strategy should be implemented to monitor the indoor air at Walgreens.

4) Based on the results of the Phase II sampling event, there is evidence of elevated levels of VOC vapors under certain subslabs at the Site. VOCs that may be associated with potential sources at the Site have also been detected in the indoor air at certain locations. While these levels do not currently warrant a CERCLA removal action, considering the elevated levels of VOCs in the subslab and the potential for these vapors to migrate into the building, a strategy should be implemented to monitor the indoor air at these locations.

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FIGURE 1

